

Not All Who Worry Lose Sleep: Personality, Normal Worry, and Sleep Disturbance Ascribed to Worry

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ABSTRACT - Although worry is often viewed as maladaptive, moderate and controllable worry may serve adaptive cognitive functions. This study investigated how individual differences in *normal worry*, described as an adaptive, goal-directed form of anticipatory cognition, relate to sleep disturbance ascribed to worry (SAW) and whether Big Five personality traits explain this link. A community and student sample of 151 adults completed the Normal Worry Questionnaire (NORWO), SAW Scale, and Big Five Mini-Markers. Hierarchical regressions showed that higher normal worry predicted lower SAW after controlling for age, gender, and perceived sleep deprivation. Regression findings indicated that normal worry incrementally predicted SAW beyond personality. A parallel mediation model revealed no indirect effects through personality traits. Findings suggest that normal worry functions as a distinct metacognitive and self-regulatory process that may buffer maladaptive attribution of sleep problems to cognitive activity, underscoring the need to distinguish adaptive from pathological worry.

Keywords:

Normal worry;
Adaptive worry;
Personality traits;
Sleep disturbance;
Metacognition;
Emotion regulation;
Individual differences

Introduction

Adaptive and maladaptive forms of worry have not been adequately differentiated. Traditional perspectives emphasize worry's pathological nature, particularly its intrusive, uncontrollable, and distressing (Borkovec et al., 1998) forms. However, some evidence suggests that worry can also serve functional purposes. When moderate in intensity and oriented toward constructive problem solving, worry may motivate preparation, planning, and self-regulation (Davey, 1994). Clarifying this distinction is crucial for refining psychological models that have historically conflated everyday anticipatory thought with maladaptive perseveration.

Normal Versus Pathological Worry

Early empirical efforts to distinguish everyday, adaptive worry from its maladaptive forms centered on the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990) and the Worry Domains Questionnaire (WDQ; Tallis et al., 1992). The PSWQ was designed to capture the tendency toward excessive, uncontrollable, and generalized worry, the cognitive hallmark of generalized anxiety disorder (Borkovec et al., 1983). In contrast, the WDQ focused on content domains of ordinary worry such as finances, relationships, and work, thereby normalizing worry as a ubiquitous human experience. Empirical comparisons demonstrated that PSWQ scores correlate more strongly with anxiety and depression, whereas WDQ scores primarily reflect perceived stress and the frequency or breadth of concerns (Kelly, 2008; Startup & Davey, 2001; Stöber, 1998). Factor-analytic research further revealed that the PSWQ uniquely measures worry's uncontrollability, a central feature of pathological worry, while the WDQ emphasizes the themes of daily preoccupations (Fresco et al., 2002; Hong, 2007).

Although both instruments capture aspects of cognitive engagement with potential stressors, they strongly correlate and are both positively associated with anxiety and depression (Davey, 1993, 1994; Dugas et al., 1995; Stöber & Joormann, 2001). Thus, they may collectively reflect elements of pathological worry rather than distinctly normal variants. Nevertheless, these studies established that worry varies in both intensity and function, laying the foundation for later attempts to operationalize normal worry as a distinct construct.

The Concept of Normal Worry

Kelly (2015) advanced this line of work by developing the Normal Worry Questionnaire (NORWO), designed to measure individual differences in everyday, manageable worry. Conceptually, *normal worry* reflects a controlled, goal-oriented form of anticipatory cognition that occupies a middle ground between vigilance and perseveration. It is distinct from neuroticism, which denotes generalized emotional reactivity (McCrae & Costa, 2008), and from trait anxiety, which reflects chronic physiological and cognitive arousal (Kelly, 2004). Rather than representing "low pathological worry," normal worry can be understood as an adaptive metacognitive stance toward potential concerns.

This framework situates normal worry within contemporary models of cognitive-emotional regulation and metacognition (e.g., Wells & Papageorgiou, 2001). Whereas pathological worry involves heightened self-referential monitoring and attempts to suppress thought (Kelly & Miller, 1999), normal worry entails flexible engagement with potential stressors and a realistic appraisal of control. In this sense, normal worry functions not merely as a disposition but as a self-regulatory cognitive process that shapes how individuals interpret and respond to anticipatory mental activity. Accordingly, individuals higher in normal worry should be less likely to attribute sleep disturbance to their mental activity, even under comparable environmental stressors.

Across multiple university samples, the NORWO has demonstrated high internal consistency ($\alpha \approx .91$), strong one-month retest reliability ($r = .81$), and a unidimensional factor structure statistically separable from the PSWQ (Kelly, 2015). Kelly (2015) continues: although inversely correlated, normal worry accounted for unique variance in adaptive coping and optimism, whereas pathological worry uniquely predicted rumination and emotional distress. This pattern

supports the conceptualization of normal worry as a relatively stable constructive cognitive style rather than simply the absence, or reverse, of pathological worry (Davey, 1993, 1994).

Finally, it has been suggested that normal worry can also be examined within broader personality frameworks such as the Big Five (Kelly, 2015). Personality traits influence both the propensity to worry and its emotional consequences (McCrae & Costa, 2008). For instance, high neuroticism predisposes individuals to greater negative affect and cognitive arousal, whereas high conscientiousness facilitates goal-directed coping and emotional regulation (Watson, 2000). These dimensions may therefore help determine whether worry functions adaptively, as vigilance and preparation, or maladaptively, as perseveration.

Sleep Disturbance Attributed to Worry

Sleep disturbance is a domain in which the differentiation between normal and pathological worry carries particular importance. Worry and pre-sleep rumination are consistent predictors of insomnia and sleep disruption (Harvey, 2002; Jansson-Fröjmark & Lindblom, 2008). To investigate this link, previous research introduced the construct of Sleep Disturbance Ascribed to Worry (SAW; Kelly, 2002), defined as the degree to which individuals attribute their sleep problems to worry. The SAW reflects a metacognitive appraisal; that is, beliefs about the causal role of worry rather than sleep quantity or physiological arousal. Such beliefs align with metacognitive models of insomnia, which posit that attempts to control or suppress worry heighten pre-sleep cognitive activation and interfere with sleep onset (Wells & Papageorgiou, 2001).

Subsequent studies (Kelly, 2003, 2017) found that SAW correlates positively with trait worry, anxiety, and insomnia severity but not with daytime fatigue or sleepiness. Hierarchical regression analyses demonstrated that SAW predicts insomnia severity even after controlling for worry and anxiety (Kelly, 2017), supporting its incremental validity. These findings indicate that SAW represents a specific attributional cognition about how strongly one believes worry causes sleep problems rather than a diffuse measure of distress. Consequently, SAW may serve as a metacognitive bridge through which individual differences in cognitive–emotional style translates into perceived sleep disturbance.

Personality, Worry, and Sleep

Research consistently links neuroticism to poorer sleep quality and pre-sleep cognitive arousal, while conscientiousness relates to better sleep hygiene and more consistent sleep schedules (Duggan et al., 2014; Stephan et al., 2018; Križan & Hisler, 2019). Neuroticism also predicts dysfunctional sleep beliefs (Gray & Watson, 2002) and insomnia onset (Jansson-Fröjmark & Lindblom, 2008). Conversely, conscientiousness may buffer against worry-related sleep disturbance by promoting self-regulation and routine (Williams & Moroz, 2009). Integrating these findings, individuals higher in normal worry may differ from those higher in pathological worry in their underlying personality configuration. Specifically, low neuroticism and high conscientiousness may foster a sense of control over one's worries, thereby reducing their attributional salience for sleep problems, whereas individuals high in neuroticism may

interpret ordinary cognitive activity through a threat-focused lens, endorsing greater SAW even when objective sleep is adequate.

The Present Study

The present study examines how normal worry relates to SAW and whether Big Five personality traits, particularly neuroticism and conscientiousness, mediate this association. This investigation extends prior research by linking an adaptive form of worry to a metacognitive outcome, positioning personality as the mechanism that determines whether worry remains functional or becomes self-disruptive. Beyond clarifying the cognitive–personality interface of worry, the findings may illuminate potential protective factors that prevent everyday worry from evolving into maladaptive patterns associated with poor sleep and emotional distress. Based on the literature and conceptual descriptions above, the following hypotheses were formed:

Hypothesis 1 (H1): Normal worry will be negatively associated with SAW after controlling age, gender, and sleep deprivation.

Hypothesis 2 (H2): Neuroticism and conscientiousness will mediate the relationship between normal worry and SAW, such that lower neuroticism and higher conscientiousness correspond to lower SAW.

Hypothesis 3 (H3): The indirect effects through personality will remain significant after adjustment for covariates, supporting a personality-mediated model linking normal worry to worry-based sleep disturbance attribution.

Method

Participants

Participants were primarily undergraduate students enrolled at a small university in the United States. Using a snowball sampling technique, students were asked to recruit additional participants, including friends, classmates, and family members. The final sample consisted of 151 adults (96 women, 55 men), including 109 students and 42 nonstudents. The average age was 28.72 years ($SD = 10.89$), ranging from 18 to 72 years.

Measures

Big Five Personality. The five major personality dimensions—extraversion, agreeableness, conscientiousness, neuroticism, and openness—were measured using Saucier's (1994) Mini-Markers, a 40-item adjective checklist rated on a 9-point Likert scale (1 = *Extremely inaccurate* to 9 = *Extremely accurate*). The Mini-Markers demonstrate adequate reliability (typical $\alpha = .70$ – $.85$) and stable five-factor structure across samples, with high convergence with other big five measures (Mooradian & Nezlek, 1996; Palmer & Loveland, 2004; Thompson, 2008). Internal consistency coefficients in the present sample ranged from .78 to .88.

Normal Worry (NORWO). Normal worry was assessed with the Normal Worry Questionnaire (NORWO; Kelly, 2015), a 9-item self-report scale measuring the frequency and controllability of everyday worries, e.g., “My worries don't seem overwhelming.” NORWO items are rated on a 5-point scale (1 = *Strongly disagree*, 5 = *Strongly agree*). Prior research established adequate internal consistency ($\alpha \approx .91$), retest reliability after one month ($r = .83$) unidimensional structure, and discriminant validity from the Penn State Worry Questionnaire (PSWQ) (Kelly, 2015). The

NORWO correlates positively with optimism and adaptive coping and negatively with pathological worry and rumination, supporting its construct validity (Kelly, 2015). Cronbach's α in the current study was .93.

Sleep Disturbance Ascribed to Worry. SAW was measured using the Sleep Disturbance Ascribed to Worry Scale (SAW Scale; Kelly, 2002), a 5-item measure assessing the extent to which individuals attribute their sleep difficulties to worry (e.g., "How often are you unable to stop worrying at bedtime?"). Items are rated on an 11-point scale (0 = *Never* to 10 = *Very often*), with higher scores indicating greater perceived sleep disturbance due to worry. The SAW Scale shows internal consistency ($\alpha = .85-.89$), one-month test-retest reliability ($r = .83$), and convergent validity with trait worry and stress, as well as discriminant validity from negative affect and general distress (Kelly, 2003, 2017; Kelly & Forbes, 2004). Cronbach's α in this sample was .89.

Sociodemographics. Participants reported their age, gender, and student vs. nonstudent status. Additionally, participants reported their average amount of sleep per night (Kumar & Vaidya, 1984) and their preferred sleep duration (both reported in hours and minutes). The difference between preferred and average sleep duration was computed as a perceived sleep deprivation index, with higher scores indicating greater subjective deprivation.

Procedure

After providing informed consent, participants completed all measures as hardcopies and returned them in sealed envelopes (signed across the seal). Undergraduate students were recruited through psychology courses and received nominal extra credit for participation. Using a snowball sampling method, students were invited to recruit nonstudent acquaintances who could complete the same survey voluntarily. Procedures were approved by the local ethics review board and conducted in accordance with the Declaration of Helsinki. Responses were anonymous, and participation required approximately 15 minutes.

Statistical Analysis

Analyses were conducted using SPSS for Windows (Version 30). All tests used a two-tailed significance level of $\alpha = .05$. Before analysis, data were examined for normality and linearity, which were not a problem. All variance inflation factors (VIF) were below 1.6, indicating no problematic multicollinearity.

Descriptive statistics, internal consistency reliability (Coefficient alpha), and Pearson correlations were computed for all variables. Independent samples *t*-tests and Pearson correlations were used to examine associations between sociodemographic factors and study variables. Consistent with prior literature (e.g., Jansson-Fröjmark & Lindblom, 2008; Kelly, 2002, 2017), age, gender, and sleep deprivation were retained as covariates for regression and mediation analyses as there was justification to do so (see Results). Student versus nonstudent status was not included because its variance overlapped substantially with age and personality dimensions; results were unchanged when this factor was added.

To address H1, a hierarchical multiple regression tested whether NORWO scores predicted SAW Scale after accounting for covariates. Age, gender, and sleep deprivation were entered at Step 1, followed by NORWO at Step 2. A third step added the five Big Five personality traits to

determine whether NORWO remained a significant predictor once dispositional factors were considered. Changes in explained variance (ΔR^2) and standardized regression coefficients (β) were used to evaluate the incremental predictive value of normal worry.

To evaluate H2 and H3, a comprehensive parallel mediation model was estimated using the PROCESS macro (version 4.2; Hayes, 2022) Model 4, with the five Big Five traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness) specified as simultaneous mediators of the relationship between NORWO and SAW Scale. Age, gender, and sleep deprivation were included as covariates. Indirect effects were tested with 10,000 bias-corrected bootstrap resamples and 95% confidence intervals (CIs). Mediation was deemed significant if the CI for an indirect effect did not include zero. PROCESS output provided estimates for the specific indirect effect of each personality trait as well as the total indirect effect through the set of mediators combined. The total effect (c path), direct effect controlling for mediators (c' path), and bootstrapped standard errors were reported to determine whether mediation was partial or full.

Results

Preliminary analyses examined sociodemographic and group differences to determine appropriate covariates. Nonstudents were significantly older than students, $t(145) = 5.43, p < .001$, but did not differ significantly in gender composition, $\chi^2(2) = 4.63, p = .113$. Nonstudents scored higher on agreeableness, $t(148) = 2.08, p = .040$, and lower on neuroticism, $t(148) = 2.12, p = .036$. Women ($M = 17.85$) scored higher than men ($M = 11.27$) on the SAW Scale, $t(149) = 3.62, p < .001$, agreeableness, $t(149) = 2.68, p = .008$, and conscientiousness, $t(149) = 2.43, p = .016$. Age was negatively correlated with neuroticism ($r = -.16, p = .049$).

Given these findings and prior research linking sociodemographic variables to worry and sleep variables, age, gender, and sleep deprivation were retained as covariates in regression and mediation analyses. Student status was initially examined but excluded from primary models because its effects overlapped with age and personality differences. Results were not appreciably different when controlling student vs. nonstudent status.

The linear regression analysis predicting SAW Scale scores is presented in Table 2. As shown in the table, Step 1 containing the covariates was significant, $\Delta R^2 = .112, F(3, 147) = 6.15, p < .001$. Among these predictors, sleep deprivation ($\beta = .18, t = 2.25, p = .026$) and gender ($\beta = .28, t = 3.54, p < .001$), emerged as the only significant variables with women reporting higher SAW Scale scores than men. Age was nonsignificant.

In Step 2, the addition of normal worry produced a significant increase in explained variance, $\Delta R^2 = .250, F(1, 146) = 57.02, p < .001$. Consistent with predictions, higher normal worry was associated with lower sleep disturbance attributed to worry ($\beta = -.52, t = 7.55, p < .001$), indicating that individuals who experience more everyday, manageable worry tend to perceive less interference of worry with their sleep.

When the Big Five personality traits were entered simultaneously at Step 3, the model approached but did not reach significance for the incremental change in variance, $\Delta R^2 = .045, F(5, 141) = 2.13, p = .066$. None of the individual traits emerged as significant predictors (all t 's < 1.6 , all p 's $> .10$). Importantly, the effect of normal worry remained strong and statistically significant ($\beta = -.53, t = 6.46, p < .001$), suggesting that the association between normal worry

Table 1: Descriptive statistics and correlations between variables

	1	2	3	4	5	6	7	<i>M</i>	<i>SD</i>	α
1. Extraversion								26.61	5.90	.858
2. Agreeableness	.07							32.68	4.19	.830
3. Conscientiousness	.16*	.13						30.46	5.10	.880
4. Neuroticism	-.26**	-.24**	-.10					21.88	5.11	.775
5. Openness	.13	.14	.32**	-.09				30.42	4.77	.802
6. NORWO	.28**	-.10	.29**	-.43**	.23**			30.01	8.04	.926
7. SAW Scale	-.15	-.01	-.02	.37**	-.04	-.56**		15.46	11.17	.892
8. Sleep Deprivation	.04	-.01	-.23**	.04	-.02	-.26**	.19*	1.55	1.58	--

Note: $N = 151$. * $p < .05$ ** $p < .01$ (two-tailed).

and reduced sleep disturbance attribution was not explained by the broader personality dimensions.

Together, these findings indicate that gender and normal worry were the primary predictors of SAW, with normal worry contributing uniquely and substantially to the model even after accounting for sociodemographics, sleep deprivation, and personality traits.

Table 2: Regressions predicting sleep disturbance ascribed to worry

Variable	Step 1			Step 2			Step 3		
	β	t	p	β	t	p	β	t	p
Age	.01	0.07	.942	.00	0.05	.964	.04	0.65	.516
Gender	.28	3.54	<.001	.21	3.15	.002	.21	2.96	.004
Sleep Deprivation	.18	2.25	.026	.04	0.63	.528	.06	0.84	.400
NORWO				-.52	7.55	<.001	-.53	6.46	<.001
Extraversion							.00	0.00	.999
Agreeableness							-.12	1.57	.119
Conscientiousness							.09	1.20	.232
Neuroticism							.11	1.40	.165
Openness							.11	1.43	.154
$\Delta R^2 = .112, F = 6.15, p < .001$			$\Delta R^2 = .250, F = 57.02, p < .001$			$\Delta R^2 = .045, F = 2.13, p = .066$			

Note: Gender was coded as 1 = men, 2 = women.

In subsequent exploratory regression analyses, using SAW Scale scores as the criterion, entering sociodemographics and sleep deprivation on Step 1, the Big Five on Step 2, and the NORWO on Step 3, on Step 2, the Big Five contributed a significant 11.9% ($p < .001$) of variance above Step 1. On this step, neuroticism was the only significant predictor of SAW Scale scores ($\beta = .33, p < .001$). On Step 3 the NORWO accounted for additional variance in SAW Scale scores above sociodemographics, sleep deprivation, and the Big Five, ($\beta = -.53, p < .001; \Delta R^2 = .176$), demonstrating incremental validity.

Mediation Analysis

The comprehensive mediation models testing Hypotheses 2 and 3 using extraversion, agreeableness, conscientiousness, neuroticism, and openness as simultaneous mediators of the relationship between NORWO and the SAW Scale after accounting for age, gender, and sleep deprivation are presented in Table 3. The overall model accounted for a significant proportion of variance in the SAW Scale ($R^2 = .361$). The total effect of normal worry on sleep disturbance was significant ($c = -0.72, SE = 0.10, 95\% \text{ CI } [-0.91, -0.54]$), indicating that higher levels of normal worry were associated with lower perceived sleep disturbance attributed to worry. When the five personality traits were entered as mediators, the direct effect remained significant ($c' = -0.74, SE = 0.11, 95\% \text{ CI } [-0.97, -0.51]$), suggesting that the association between normal worry and SAW was not mediated by the Big Five traits.

Table 3: Parallel Mediation of big five personality traits in the relationship between normal worry and sleep disturbance ascribed to worry

Mediator	Effect	SE	95% BC CI
Extraversion	0.00	0.03	-.058, .051
Agreeableness	0.01	0.02	-.017, .059
Conscientiousness	0.04	0.03	-.019, .108
Neuroticism	-0.07	0.05	-.156, .030
Openness	0.03	0.03	-.007, .097
Total Indirect Effect	0.02	0.06	-.101, .153
Direct Effect (c')	-0.74	0.11	-.966, -.513
Total Effect (c)	-0.72	0.10	-.914, -.535

Note: Bootstrapped indirect effects computed using 10,000 bias-corrected resamples. Confidence intervals (CI) without "0" are significant at $p < .05$. Models control age, gender, and sleep deprivation. BC CI = Bootstrapped bias corrected confidence interval.

None of the specific indirect effects through the five personality dimensions reached statistical significance, as all 95% CIs included zero: extraversion (indirect = 0.00, 95% CI [-0.06, 0.05]), agreeableness (0.01, 95% CI [-0.02, 0.06]), conscientiousness (0.04, 95% CI [-0.02, 0.11]), neuroticism (-0.07, 95% CI [-0.16, 0.03]), and openness (0.03, 95% CI [-0.01, 0.10]). The total indirect effect across all five mediators was likewise nonsignificant (0.02, 95% CI [-0.10, 0.15]).

Overall, these results indicate that although normal worry was strongly associated with lower sleep disturbance ascribed to worry, this relationship operated independently of broad personality traits. In other words, the association between manageable, potentially productive, worry and reduced worry-related sleep disturbance does not appear to be explained by the Big Five dimensions.

Discussion

This study examined how *normal worry* operationalized by the NORWO, relates to the tendency to attribute sleep disturbance to worry (SAW), and whether the Big Five personality traits mediate that association. Higher normal worry was robustly associated with lower SAW, even after controlling for age, gender, and perceived sleep deprivation. The effect remained strong after including the Big Five traits (and incremental of the Big Five), suggesting that the link between normal worry and lower worry-attributed sleep disturbance is not simply a by-product of broad personality dispositions. Further, and contrary to expectations, the parallel mediation model including all five personality traits did not yield significant indirect effects, indicating that the association of normal worry with SAW operates largely independent of the Big Five dimensions.

Normal Worry and Sleep Disturbance

The inverse relationship between normal worry and SAW supports the assertion that not all worry is dysfunctional (Davey, 1994; Kelly, 2015). When worry is experienced as controllable, specific, and oriented toward practical concerns individuals appear less likely to view their worry as the cause of sleep disruption. Such worry may remain functional, serving roles in vigilance, planning, or preparation rather than evolving into intrusive pre-sleep rumination. This interpretation aligns with Davey's (1994) conceptualization of moderate, problem-solving worry as adaptive, in contrast to pathological worry's uncontrollable and perseverative nature (Borkovec et al., 1998).

From a sleep-cognition perspective, individuals who perceive their worry as manageable may refrain from metacognitive attributions such as 'my worry ruined my sleep,' as reflected in the SAW Scale (Kelly, 2002, 2017). This perspective helps explain why high normal worry corresponds to reduced SAW: the individual's appraisal of worry as ordinary or manageable may buffer against cognitive-emotional escalation at bedtime. These findings extend prior research (Harvey, 2002) by suggesting that the *quality* rather than the *quantity* of worry determines its relation to sleep disturbance. Whereas pathological worry contributes to pre-sleep cognitive arousal and insomnia, normal worry may signify a protective, self-regulatory cognitive stance.

Personality as a Context for Worry

Although personality traits such as neuroticism and conscientiousness have well-established links to both worry and sleep quality (Duggan et al., 2014; Stephan et al., 2018; Križan & Hisler, 2019), they did not mediate the normal worry–SAW relationship in the current study. One interpretation is that normal worry represents a domain-specific metacognitive style rather than a direct manifestation of global personality traits. The Big Five model describes broad tendencies in affect and behavior, whereas normal worry may index a more circumscribed, adaptive mode of engaging with potential threats characterized by awareness, control, and measured concern.

This lack of mediation contrasts with prior research linking pathological worry to high neuroticism and low conscientiousness (Thielsch et al., 2015; Starcevic, 1995). The dissociation with previous findings supports the conceptual independence of some forms of worry as an adaptive cognitive process that can coexist with emotional stability and effective regulation. Although neuroticism correlated positively with SAW, it did not explain the negative link between normal worry and SAW. Similarly, conscientiousness correlated modestly with normal worry but not with SAW. These results suggest that the Big Five dimensions might influence general affective tendencies associated with sleep behavior but do not fully account for how individuals construe the relationship between worry and sleep.

Importantly, this study represents the first direct empirical examination of how normal worry relates to the Big Five personality dimensions. Previous work has associated pathological worry with high neuroticism and low conscientiousness (Thielsch et al., 2015; Starcevic, 1995), but no prior research has examined the supposedly adaptive variant. The current findings show that normal worry correlates modestly but distinctly with several traits—positively with conscientiousness and openness and negatively with neuroticism yet remains statistically independent when predicting worry-based sleep disturbance. This pattern might indicate that

normal worry reflects a cognitive–emotional regulation style that cuts across personality dimensions rather than being reducible to them. In this sense, the NORWO contributes uniquely to the taxonomy of individual differences by capturing a functional aspect of anticipatory cognition, associated with, but not adequately represented within the Five-Factor Model.

Of note, exploratory incremental-validity analyses confirmed that normal worry predicted lower SAW beyond personality traits, accounting for an additional 17.6% of variance after controlling for neuroticism and the other Big Five dimensions. This reinforces the distinctiveness of normal worry as reflecting an adaptive cognitive style.

Possible Implications

The current findings reinforce the importance of distinguishing between adaptive and maladaptive forms of worry. Much of the literature on individual differences emphasized pathological worry and its associations with distress and dysfunction, but the current results highlight the potential benefits of a normal form of worry; it might represent a cognitive process that facilitates problem-solving without hyperarousal and perceived lack of cognitive control. By demonstrating that higher normal worry corresponds to lower SAW, this study supports the idea that controllable, constructive worry may promote healthier cognitive appraisals of sleep and perhaps broader emotional regulation.

From a practical standpoint, these findings imply that interventions targeting sleep-related worry might focus less on eliminating worry altogether and more on reframing its function. Individuals could be encouraged to reinterpret their worry as manageable and instrumental rather than intrusive or uncontrollable (Hong, 2007). Cognitive-behavioral and metacognitive interventions (Wells & Papageorgiou, 2001) might therefore benefit from strengthening this adaptive normal worry stance. The lack of mediation by the Big Five further suggests that such interventions need not be heavily tailored to broad personality profiles; instead, they may be effective across diverse dispositional backgrounds if they emphasize cognitive controllability and reinterpretation of worry's role in sleep.

Limitations and Future Directions

Several limitations of the current study should be acknowledged. First, the cross-sectional design does not allow causal inference. Longitudinal and experimental designs are needed to clarify whether normal worry actively protects against sleep disturbance over time. Second, although the inclusion of nonstudents broadened the sample, it remained largely university-based, limiting generalizability. Third, all variables were assessed by self-report, raising the possibility of shared method variance and subjective bias. Future research should incorporate objective sleep measures (e.g., actigraphy or polysomnography) and ecological momentary assessment of worry processes. Moreover, additional research is needed to further broaden the nomological net of the NORWO examining its relations with variables separate from pathological worry like a rational, problem-solving style, perceptions and actual frequency of worry, cognitive flexibility, self-esteem, and perceptions of the social environment (Kelly, 2014; Kelly & Miller, 1999; Kelly & Paolini, 2014). Fourth, the current study did not account for pathological worry or other forms of sleep disruption. While previous findings suggested the NORWO accounts for its

own statistical variance (Kelly, 2015), it has not yet been established that it represents a separate form of worry. Future research should include a measure of pathological worry as a control.

Finally, the Big Five may not capture the cognitive-metacognitive characteristics most relevant to SAW. Constructs such as worry tolerance, intolerance of uncertainty, cognitive flexibility, or metacognitive beliefs about control and responsibility (Spada et al., 2008) may serve as more proximal mediators. Future research could examine these mechanisms within longitudinal and multi-method frameworks to map how adaptive cognitive styles, personality, and sleep-related attributions interact over time.

Conclusion

In summary, this study provides some evidence that normal worry, conceived as a controllable, goal-oriented form of anticipatory thought, is inversely associated with sleep disturbance attributed to worry. This relationship appears robust across sociodemographic and dispositional factors, suggesting that normal worry is part of, or related to, a self-regulatory cognitive style rather than a reflection of broader personality traits. By delineating adaptive from maladaptive worry, the findings advance understanding of individual differences in cognitive-emotional regulation and identify SAW as a meaningful outcome for studying how people interpret and manage their mental activity surrounding sleep.

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